KinetDx DS3000 DICOM Server

DICOM Conformance Statement

Revision: 3.0

Revision History

Revision	Date	Author	Reason for Change
1.6	03/25/99	Steve Roush	First Acuson version.
1.7	12/17/99	Steve Roush	Updated to remove Big Endian Explicit.
1.8	03/07/00	Steve Roush	Updated Implementation Class UID and Implementation Version Name.
2.8	09/10/01	Brian Ferguson	Revision and format change for 2.8 Software Release
2.8.1	10/10/01	Brian Ferguson	Made minor information corrections
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1. INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

This conformance statement describes the DICOM Interface of the Acuson implementation of a Medical Imaging Storage and Archive System (KinetDx DS3000 DICOM Server) running Software Version 3.0. From this point forward, KinetDx DS3000 DICOM Server will be referred to as KinetDx Server.

The KinetDx Server DICOM Interface acts as a service class provider (SCP) for Storage, Storage Commitment, Verification and Query/Retrieve Service Classes.

The KinetDx Server DICOM Interface acts as a service class user (SCU) for Storage, Storage Commitment, Verification, Query/Retrieve, Patient Management, Study Management, Results Management and Basic Worklist Management Service Classes.

This DICOM Conformance Statement is written according to part PS 3.2 of the DICOM 3.0 standard.

1.2 SOURCES FOR THIS DOCUMENT

ACR-NEMA Digital Imaging and Communications in Medicine (DICOM) Version 3.0 Parts 1 – 14.

1.3 ACRONYMS AND ABBREVIATIONS

The following Acronyms and abbreviations are used in this document:

- ACR — American College of Radiology
- AE — Application Entity
- DICOM — Digital Imaging and Communications in Medicine
- FSC — File-set Creator
- FSR — File-set Reader
- FSU — File-set Updater
- NEMA — National Electrical Manufacturers Association
- PDU — Protocol Data Unit
- SCP — Service Class Provider
- SCU — Service Class User
- SOP — Service Object Pair
- TCP/IP — Transmission Control Protocol/Internet Protocol
- UID — Unique Identifier

1.4 CONNECTIVITY AND INTEROPERABILITY

The implementation of the KinetDx Server DICOM interface has been tested to assure correspondence with this Conformance Statement. But the Conformance Statement and the DICOM standard does not guarantee interoperability.

The user must compare the relevant Conformance Statements and if a successful interconnection should be possible, the user is responsible to specify an appropriate test suite and to validate the interoperability, which is required.

A network environment may need additional functions out of the scope of DICOM.

2. IMPLEMENTATION MODEL

KinetDx Server is an image database and storage facility. KinetDx Server is a single application entity that stores images sent to it by service class users, takes responsibility for storage of the images, allows queries based on several standard query models, and retrieves requested images. The KinetDx Server is able to validate images before they are stored internally by querying a service class provider for demographic information. Studies found to be registered with the HIS/RIS are stored, while studies not found to be registered are automatically corrected, where possible, or set aside for a technician to correct.

2.1 APPLICATION DATA FLOW DIAGRAM

Figure 2.1-1 depicts the DICOM data flow to and from KinetDx Server. This section discusses the application's data flow represented in this diagram.

In the remote real-world activity labeled "Verify Communication", a remote application entity (AE) initiates an association and requests verification from KinetDx Server. Assuming KinetDx Server receives the request, it responds to the remote AE and communication between the two AE's has been verified. KinetDx Server can also initiate an association and request verification to a remote AE.

In the remote real-world activity "Store Objects", a remote AE initiates an association with KinetDx Server and sends one or more objects to KinetDx Server. When KinetDx Server receives an object, it stores that object in Part 10 format on some media and registers that object in the database. KinetDx Server can also initiate an association and send one or more objects to a remote AE.

In the remote real-world activity "Request Storage Commitment", a remote AE initiates an association with KinetDx Server and requests commitment for the safekeeping of one or more composite SOP instances on KinetDx Server. KinetDx Server will open a new association with the remote AE to indicate success or failure. KinetDx Server can also initiate an association and request commitment for the safekeeping of one or more composite SOP instances to a remote AE.

In the remote real-world activity "Find Objects", a remote AE initiates an association with KinetDx Server and sends a query. KinetDx Server will search the database for possible matches with composite SOP instances. The results of the query are returned to the remote AE using the same association. KinetDx Server can also initiate an association and send a query to a remote AE.

In the remote real-world activity "Move Objects", a remote AE initiates an association with KinetDx Server and requests some composite SOP instances be retrieved. KinetDx Server will search the database for possible matches with composite SOP instances. The resulting composite SOP instances are transferred to either the same AE that requested the retrieval or to another AE over a new association. KinetDx Server can also initiate an association and request some composite SOP instances be retrieved from a remote AE.

In the remote real-world activity "Get Worklist", KinetDx Server initiates an association with a remote AE and sends a query for information about a patient or study. KinetDx Server will update Composite SOP instances with information obtained from the query.

In the remote real-world activity "Unsolicited Notifications", a remote AE initiates an association with KinetDx Server and sends an unsolicited notification event containing changes in the state of a patient, study, visit, or interpretation. If the particular notification event is recognized, then KinetDx Server updates its database or performs events based on configuration settings.

In the remote real-world activity "Study Update", KinetDx Server initiates an association with a remote AE and provides status information about a real-world study.

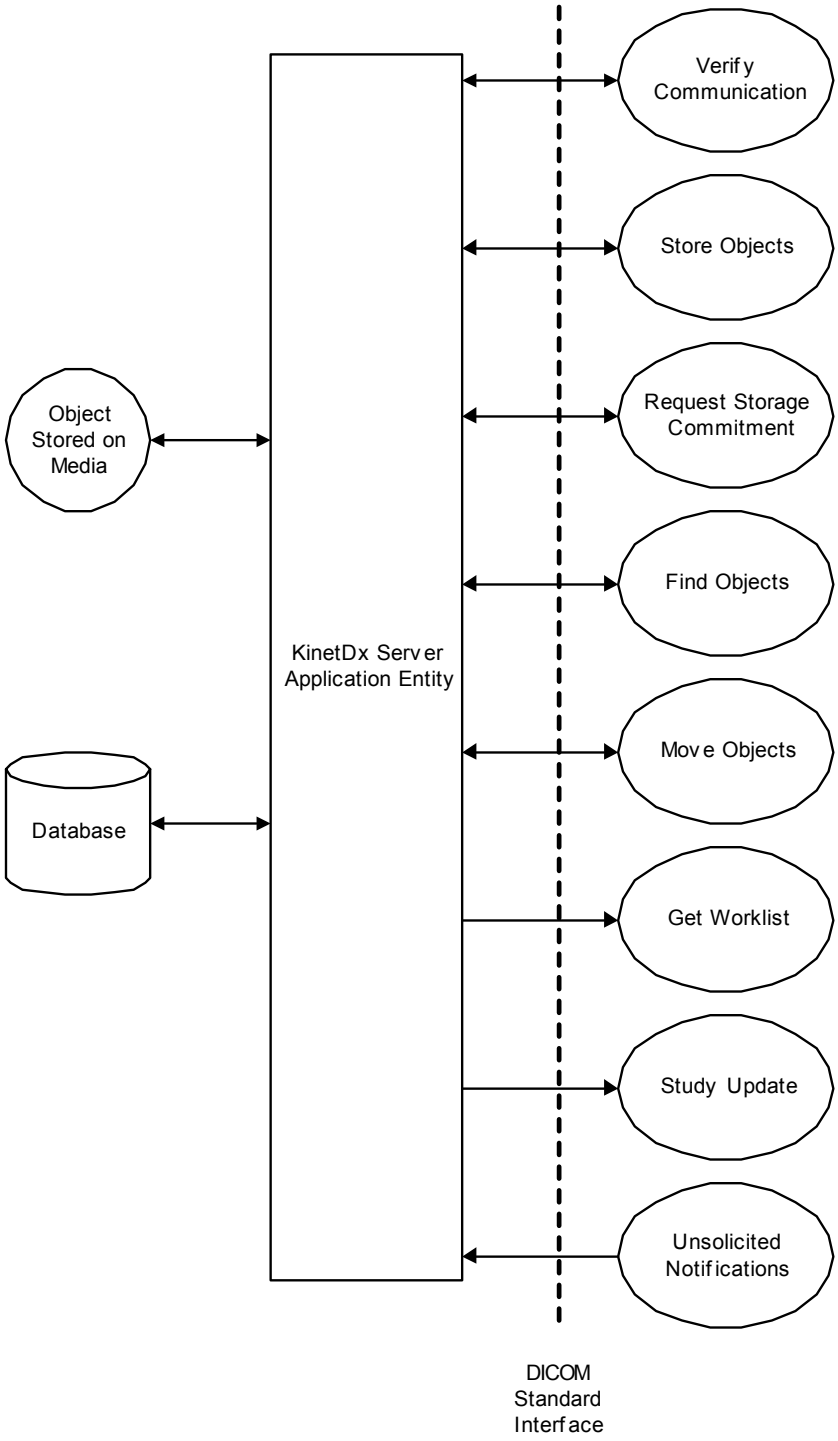

Figure 2.1-1 KinetDx Server Implementation Model

2.2 FUNCTIONAL DEFINITION OF APPLICATION ENTITIES

KinetDx Server operates as a single AE whose title is configurable. Its functions are described in section 2.1.

2.3 SEQUENCING OF REAL WORLD ACTIVITIES

- KinetDx Server must store objects to a remote AE before a storage commitment request for those objects is sent.
-
- KinetDx Server must receive objects from a remote AE before a study update is sent.

- If configured to archive objects to PACS, KinetDx Server may request objects be moved from a remote AE to local media to service an object move request from another remote AE.

3. APPLICATION ENTITY SPECIFICATIONS

KinetDx Server operates as a single application entity.

3.1 KINETDX SERVER SPECIFICATIONS

The KinetDx Server Application Entity provides Standard Conformance to the DICOM V3.0 SOP Classes listed in Table 3.1-1 as an SCU and/or SCP:

SOP Class	SOP Class UID	SCU/SCP
Verification	1.2.840.10008.1.1	Y/Y
Basic Study Content Notification	1.2.840.10008.1.9	Y/N
Storage Commitment Push Model	1.2.840.10008.1.20.1	Y/Y
Detached Patient Management	1.2.840.10008.3.1.2.1.1	Y/N
Detached Visit Management	1.2.840.10008.3.1.2.2.1	Y/N
Detached Study Management	1.2.840.10008.3.1.2.3.1	Y/N
Study Component Management	1.2.840.10008.3.1.2.3.2	Y/N
Detached Interpretation Management	1.2.840.10008.3.1.2.6.1	Y/N
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Y/Y
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Y/Y
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Y/Y
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Y/Y
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Y/Y
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Y/Y
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Y/Y
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Y/Y
Patient Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.1.1	Y/Y
Patient Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.1.2	Y/Y
Study Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.2.1	Y/Y
Study Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.2.2	Y/Y
Patient/Study Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.3.1	Y/Y
Patient/Study Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.3.2	Y/Y
Modality Worklist Information Model C-Find	1.2.840.10008.5.1.4.31	Y/N

Table 3.1-1 KinetDx Server Supported SOP Classes

3.1.1 Association Establishment Policies

3.1.1.1 General

The following Application Context Name will be proposed and recognized by KinetDx Server:

- DICOM 3.0 Application Context 1.2.840.10008.3.1.1.1

KinetDx Server has no limitations for maximum PDU size.

3.1.1.2 Number of Associations

The maximum number of simultaneous associations accepted by KinetDx Server is configurable at run time based on system resources available. By default, the maximum number of associations is set at 64. There is no inherent limit to the number of associations other than limits imposed by the computer operating system.

3.1.1.3 Asynchronous Nature

KinetDx Server allows a single outstanding operation on any association. Therefore, KinetDx Server does not support asynchronous operations window negotiation other than the default as specified by the DICOM specification.

3.1.1.4 Implementation Identifying Information

KinetDx Server uses the following implementation identifying parameters:

- Implementation Class UID 1.2.124.113532.3510
- Implementation Version Name MITRAJUNE1997

3.1.2 Association Initiation by Real-World Activity

KinetDx Server only initiates associations for the following real-world activities:

- Verify Communication
- Store Objects
- Request Storage Commitment
- Find Object
- Move Object
- Get Patient/Study Information
- Notification of Study Status Change

3.1.2.1 Real-World Activity - Verify Communication

3.1.2.1.1 Associated Real-World Activity – Verify Communication

KinetDx Server will verify DICOM connections. An association is established when the user initiates a station test operation from the graphical user interface.

3.1.2.1.2 Proposed Presentation Contexts – Verify Communication

KinetDx Server will propose the Presentation Contexts shown in Table 3.1-2.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 3.1-2 Proposed Presentation Contexts - Verify Communication

3.1.2.1.3 SOP Specific Conformance – Verify Communication

KinetDx Server provides standard conformance to the DICOM Verification Service Class as an SCU.

3.1.2.2 Real-World Activity – Store Objects

3.1.2.2.1 Associated Real World-Activity – Store Objects

KinetDx Server will send objects that have been sent to it previously to a remote AE for storage. An association is established when the user initiates a transmit request. KinetDx Server will establish an association automatically in response to a C-MOVE request, archive to PACS autopilot notification or configured study routing rules.

3.1.2.2.2 Proposed Presentation Contexts – Store Objects

KinetDx Server may propose any of the Presentation Contexts shown in Table 3.1-3.

KinetDx Server will propose the transfer syntax used when the object was initially accepted by the server and Implicit VR Little Endian.

Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID	Name UID		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian 1.2.840.10008.1.2 Explicit VR Little Endian 1.2.840.10008.1.2.1	SCU	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.5			
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7			
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian 1.2.840.10008.1.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Lossless, Process 14 1.2.840.10008.1.2.4.70	SCU	None
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Implicit VR Little Endian 1.2.840.10008.1.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Baseline (Process 1) 1.2.840.10008.1.2.4.50 RLE Lossless 1.2.840.10008.1.2.5	SCU	None
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1			
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6			
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1			

Table 3.1-3 Proposed Presentation Contexts – Store Objects

3.1.2.2.3 SOP Specific Conformance – Store Objects
KinetDx Server provides Standard conformance to the DICOM Storage Service Class as an SCU.

A successful C-Store response status will not generate any actions.

An unsuccessful C-Store response will generate a warning dialog and the operation will remain in the Job Queue. The number of automated retry attempts and the time interval between each is configurable for each remote AE.

A warning status received in response to a C-Store operation will be treated in the same manner as an unsuccessful C-Store response.

3.1.2.3 Real-World Activity – Request Storage Commitment

3.1.2.3.1 Associated Real-World Activity – Request Storage Commitment
KinetDx Server can send images to another SCP for permanent storage and request safe keeping of a set of SOP instances. KinetDx Server expects a notification from the SCP.

3.1.2.3.2 Proposed Presentation Contexts – Request Storage Commitment

KinetDx Server will propose the Presentation Contexts shown in Table 3.1-4.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 3.1-4 Proposed Presentation Contexts – Request Storage Commitment

3.1.2.3.3 SOP Specific Conformance – Request Storage Commitment

KinetDx Server provides partial conformance to the DICOM Storage Commitment Service Class as an SCU. The Action Type and Action Information specified in Table 3.1-5 are supported. The KinetDx Server does not support explicit role negotiation.

Action Type Name	Action Type ID	Attribute Name	Tag
Request Storage Commitment	1	Transaction UID	(0008,1195)
		Referenced SOP Sequence	(0008,1199)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		Referenced Study Component Sequence	(0008,1111)
		> Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)

Table 3.1-5 Storage Commitment Request - Action Information

3.1.2.3.3.1 Operations

KinetDx Server will generate an N-ACTION primitive if the local configuration setting for the remote AE is enabled for storage commitment. KinetDx Server only supports the Storage AE as the destination for the storage commitment N-Action.

- KinetDx Server may request storage commitment for all the SOP Class UIDs listed in Table 3.1-3.
- KinetDx Server supports the Referenced Study Component Sequence Attribute.
- KinetDx Server will keep the Transaction ID applicable indefinitely.
- KinetDx Server does not support the optional Storage Media File-Set ID and UID Attributes in the N-Action

3.1.2.3.3.1 Notifications

- KinetDx Server does not perform any actions when a success status is received.
- KinetDx Server will generate a warning dialog and the operation will remain in the Job Queue when a failure status is received. The number of automated retry attempts and the time interval between each is configurable for each remote AE.

3.1.2.3.3.1 Implementation Specific Details

- KinetDx Server does not utilize storage commitment when configured to archive studies to a remote SCP.

- KinetDx Server only sends the storage commitment request to the same remote AE as the storage request was sent.

3.1.2.4 Real-World Activity – Find Object

3.1.2.4.1 Associated Real-World Activity – Find Object

KinetDx Server can query a remote AE for composite objects to the Series Level. An association is established when the user initiates a query from the graphical user interface. KinetDx Server will establish an association automatically to query a remote AE to obtain a list of relevant objects based on pre-fetch configuration rules.

3.1.2.4.2 Proposed Presentation Contexts – Find Object

KinetDx Server will propose the Presentation Contexts shown in Table 3.1-6.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Yes
Study Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.2.1				
Patient/Study Only Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.3.1				

Table 3.1-6 Proposed Presentation Contexts – Find Object

3.1.2.4.3 SOP Specific Conformance – Find Object

KinetDx Server provides standard conformance to the DICOM Query/Retrieve Service Class as an SCU. The Query/Retrieve Information Model used depends on the attributes used to constrain the query.

KinetDx Server supports the Relational-queries extended SCU behavior. The Attributes used in the Patient Root Query are listed in Table 3.1-7. The Patient and Study Level Attributes in Table 3.1-7 are also supported for the Patient/Study Only Query/Retrieve.

Patient Root Query Attributes			
Level	Description	Tag	Type
Patient	Patient's Name	(0010,0010)	R
Patient	Patient ID	(0010,0020)	U
Patient	Patient's Birth Date	(0010,0030)	O
Patient	Patient's Sex	(0010,0040)	O
Patient	Current Patient Location	(0038,0300)	O
Study	Study Date	(0008,0020)	R
Study	Study Time	(0008,0030)	R
Study	Accession Number	(0008,0050)	R
Study	Study ID	(0020,0010)	R
Study	Study Instance UID	(0020,000D)	U
Study	Referring Physician's Name	(0008,0090)	O
Study	Study Description	(0008,1030)	O
Study	Name of Physician(s) Reading Study	(0008,1060)	O
Study	Admitting Diagnoses Description	(0008,1080)	O
Study	Patient's Age	(0010,1010)	O
Study	Number of Study Related Instances	(0020,1208)	O

Study	Station Name	(0008,1010)	O
Study	Performing Physician's Name	(0008,1050)	O
Study	Study Status ID	(0032,000A)	O
Study	Requesting Physician	(0032,1032)	O
Series	Modality	(0008,0060)	R
Series	Series Number	(0020,0011)	R
Series	Series Instance UID	(0020,000E)	U
Series	Series Description	(0008,103E)	O
Series	Operator's Name	((0008,1070)	O

Table 3.1-7 Patient Root Query Attributes

Note: KinetDx Server includes the Patient ID Attribute in all levels of the query and Study Instance UID Attribute in the Series level query.

KinetDx Server supports the Relational-queries extended SCU behavior. The Attributes used in the Study Root Query are listed in Table 3.1-8.

Study Root Query Attributes			
Level	**Description**	**Tag**	**Type**
Study	Study Date	(0008,0020)	R
Study	Study Time	(0008,0030)	R
Study	Accession Number	(0008,0050)	R
Study	Patient's Name	(0010,0010)	R
Study	Patient ID	(0010,0020)	R
Study	Study ID	(0020,0010)	R
Study	Study Instance UID	(0020,000D)	U
Study	Referring Physician's Name	(0008,0090)	O
Study	Study Description	(0008,1030)	O
Study	Name of Physician(s) Reading Study	(0008,1060)	O
Study	Admitting Diagnoses Description	(0008,1080)	O
Study	Patient's Birth Date	(0010,0030)	O
Study	Patient's Sex	(0010,1040)	O
Study	Patient's Age	(0010,1010)	O
Study	Number of Study Related Instances	(0020,1208)	O
Study	Station Name	(0008,1010)	O
Study	Performing Physician's Name	(0009,1050)	O
Study	Study Status ID	(0032,000A)	O
Study	Requesting Physician	(0032,1032)	O
Study	Current Patient Location	(0038,0300)	O
Series	Modality	(0008,0060)	R
Series	Series Number	(0020,0011)	R
Series	Series Instance UID	(0020,000E)	U
Series	Series Description	(0008,103E)	O
Series	Operator's Name	((0008,1070)	O

Table 3.1-8 Study Root Query Attributes

Note: KinetDx Server includes the Study Instance UID Attribute in the Series level query

3.1.2.5 Real-World Activity – Move Object

3.1.2.5.1 Associated Real-World Activity – Move Object

KinetDx Server can retrieve composite objects from a remote AE. An association is established when the user initiates a query from the graphical user interface. KinetDx Server will establish an association

automatically to retrieve objects that were archived to the remote AE or to pre-fetch relevant objects from the remote AE based on pre-fetch configuration rules.

3.1.2.5.2 Proposed Presentation Contexts – Move Object
KinetDx Server will propose the Presentation Contexts shown in Table 3.1-9.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Patient Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	Yes
Study Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.2.2				
Patient/Study Only Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.3.2				

Table 3.1-9 Proposed Presentation Contexts – Find Object

3.1.2.5.3 SOP Specific Conformance – Move Object
KinetDx Server provides standard conformance to the DICOM Query/Retrieve Service Class as an SCU.

- KinetDx Server supports the Relational-retrieve extended SCU behavior.

3.1.2.6 Real-World Activity – Get Worklist

3.1.2.6.1 Associated Real-World Activity – Get Worklist
KinetDx Server can query a remote AE for patient and study information that matches certain query constraints. KinetDx Server will establish an association with a remote AE when the user initiates a query from the graphical user interface. KinetDx Server will establish an association automatically to verify an incoming study or if an unsolicited notification is received from a remote AE depending on HIS verification configuration rules.

3.1.2.6.2 Proposed Presentation Contexts – Get Worklist
KinetDx Server will propose the Presentation Contexts shown in Table 3.1-10.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None

Table 3.1-10 Proposed Presentation Contexts – Get Worklist

3.1.2.6.3 SOP Specific Conformance – Get Worklist
KinetDx Server provides Standard conformance to the DICOM Basic Worklist Management Service Class as an SCU.

KinetDx Server may request matching on the following Optional Matching Key Attributes:
Accession Number (0008,0050)
Study Instance UID (0020,000d)
Study Status ID (0032,000a)
Scheduled Station Name (0040, 0400)

The Study Classification and Study Scheduling Modules are Extended SOP Class attributes and are not part of the Modality Worklist Information Model.

KinetDx Server will use the format 20010101-20011231 for date range matching.

KinetDx Server requests the Return Key attributes listed in Table 3.1-11.

Module	Attribute Name	Tag	Notes
Scheduled Procedure Step	Scheduled Procedure Step Sequence	(0040,0100)	
	>Scheduled Station AE Title	(0040,0001)	
	>Scheduled Procedure Step Start Date	(0040,0002)	See Note 1
	>Scheduled Procedure Step Start Time	(0040,0003)	
	>Modality	(0008,0060)	See Note 1
	> Scheduled Performing Physician's Name	(0040,0006)	
	>Scheduled Station Name	(0040,0010)	See Note 1
	>Comments on the Scheduled Procedure Step	(0040,0400)	
Requested Procedure	Requested Procedure ID	(0040,1001)	
	Requested Procedure Description	(0032,1060)	
	Requested Procedure Code Sequence	(0032,1064)	
	> Code Value	(0008,0100)	
	> Coding Scheme Designator	(0008,0102)	
	> Code Meaning	(0008,0104)	
	Study Instance UID	(0020,000d)	
	Reason for the Requested Procedure	(0040,1002)	
	Requested Procedure Comments	(0040,1400)	
Imaging Service Request	Accession Number	(0008,0050)	See Note 1
	Referring Physician's Name	(0008,0090)	
	Reason for Imaging Service Request	(0040,2001)	
	Imaging Service Request Comments	(0040,2400)	
Visit Identification	Admission ID	(0038,0010)	
Visit Status	Current Patient Location	(0038,0300)	
Visit Relationship	Referenced Patient Sequence	(0008,1120)	
	> Referenced SOP Instance UID	(0008,1155)	
Patient Identification	Patient's Name	(0010,0010)	See Note 1
	Patient ID	(0010,0020)	See Note 1
	Other Patient IDs	(0010,1000)	
	Patient's Birth Date	(0010,0030)	
	Patient's Sex	(0010,0040)	
	Patient's Age	(0010,1010)	
	Military Rank	(0010,1080)	
	Branch of Service	(0010,1081)	
Study Classification	Study Status ID	(0032,000a)	See Note 1
	Study Priority ID	(0032,000c)	
Study Scheduling	Requesting Physician	(0032,1032)	
	Requesting Service	(0032,1033)	

Table 3.1-11 Requested Return Key Attributes

Note 1: These attributes are available as query criteria in the Study Fixing interface.

3.1.2.7 Real-World Activity – Study Update

3.1.2.7.1 Associated Real-World Activity – Study Update

KinetDx Server can update a remote AE when a study has been completed. KinetDx Server will establish an association automatically to update study status based on configuration rules.

3.1.2.7.2 Proposed Presentation Contexts – Study Update

KinetDx Server will propose the Presentation Contexts shown in Table 3.1-12.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Component Management	1.2.840.10008.3.1.2.3.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Basic Study Content Notification	1.2.840.10008.1.9				

Table 3.1-12 Proposed Presentation Contexts – Study Update

3.1.2.7.3 SOP Specific Conformance – Study Update

KinetDx Server provides standard conformance to the DICOM Study Content Notification and partial conformance to the Study Component Management Service Classes as an SCU. The Study Component Management is not conformant to PS3.4, however it is included in this document since some remote AEs do provide support for the KinetDx implementation.

KinetDx Server will attempt to use Study Component Management over Basic Study Content Notification if both SOP classes are supported by the remote AE.

3.1.2.7.3.1 Study Component Management - Operations

KinetDx Server can create an instance of the Study Component SOP and provide information about a specific real-world Study using the DIMSE N-CREATE Service.

KinetDx Server does not provide the following Type1 Attributes:

Referenced Study Sequence (0008,1110)
>Referenced SOP Class UID (0008,1150)
>Referenced SOP Instance UID (0008,1155)

Procedure Code Sequence (0008,1032)
>Code Value (0008,1032)
>Coding Scheme Designator (0008,0102)
>Code Meaning (0008,0104)

KinetDx Server will include the following Private Data Element:

Tag (0003,3000)
Name Patient Instance UID
VR UI
VM 1

KinetDx will provide the Attribute Values listed in Table 3.1-13.

Attribute Name	Tag
Specific Character Set	(0008,0005)
Modality	(0008,0060)
Study Component Status ID	(0032,1055)
Study Description	(0008,1030)
Study ID	(0020,0010)
Study Date	(0008,0020)
Study Time	(0008,0030)
Accession Number	(0008,0050)

Attribute Name	Tag
Retrieve AE Title	(0008,0054)
Institution Name	(0008,0080)
Referring Physician's Name	(0008,0090)
Station Name	(0008,1010)
Institutional Department Name	(0008,1040)
Patient's Name	(0010,0010)
Patient ID	(0010,0020)
Patient's Birth Date	(0010,0030)
Patient's Sex	(0010,0040)
Other Patient IDs	(0010,1000)
Study Instance UID	(0020,000D)
Acquisition In Study	(0020,1004)
Study Status ID	(0032,000A)
Study Priority ID	(0032,000C)
Requesting Physician	(0032,1032)
Study Completion Date	(0032,1050)
Study Completion Time	(0032,1051)
Current Patient Location	(0038,0300)
Requested Procedure ID	(0040,1001)
Patient Instance UID	(0003,3000)

Table 3.1-13 Study Component Management N-CREATE Attributes

3.1.2.7.3.2 Basic Study Content Notification

KinetDx Server can issue a Basic Study Content Notification to a remote AE using the DIMSE N-CREATE Service to identify the change in study status.

- KinetDx Server processes all Successful Response Status Code shown in Table 3.1-14 identically.

Service Status	Further Meaning	Response Status Codes
Success	Complete Study Content exists on system supporting SCP	0000
Success	Partial Study Content exists on system supporting SCP	0001
Success	None of the Study Content exists on system supporting SCP	0002
Success	It is unknown whether or not study content exists on system supporting SCP	0003
Failed	Failed Operation	Cxxx

Table 3.1-14 Study Content Notification Response Statuses

- KinetDx Server includes the Basic Study Descriptor IOD Attributes shown in Table 3.1-15.
- KinetDx Server always includes the Type 2C Elements indicated in Table 3.1-15 as part of the C-Store.
- KinetDx Server includes the Attribute Accession Number (0008,0050) that is not part of the Basic Study Creator IOD.

Module	Attribute Name	Tag	Notes
Patient Summary	Patient's Name	(0010,0010)	
	Patient ID	(0010,0020)	
Study Content	Study ID	(0020,0010)	
	Study Instance UID	(0020,000D)	

Module	Attribute Name	Tag	Notes
	Referenced Series Sequence	(0008,1115)	
	>Series Instance UID	(0020,000E)	
	>Retrieve AE Title	(0008,0054)	Type 2C
	>Referenced Image Sequence	(0008,1140)	
	>Retrieve AE Title	(0008,0054)	Type 2C
	>Referenced SOP Class UID	(0008,1150)	
	>Referenced SOP Instance UID	(0008,1155)	
SOP Common	SOP Class UID	(0008,0016)	
	SOP Instance UID	(0008,0018)	
	Accession Number	(0008,0050)	Not part of IOD

Table 3.1-15 Basic Study Content Notification N-CREATE Attributes

3.1.3 Association Acceptance Policy

KinetDx Server accepts associations for the following real-world activities:

- Verify Communication
- Store Objects
- Request Storage Commitment
- Find Object
- Move Object
- Unsolicited Notifications

Association requests from unknown Application Entities will be rejected by KinetDx Server.

3.1.3.1 Real-World Activity - Verify Communication

3.1.3.1.1 Associated Real-World Activity – Verify Communication

KinetDx Server will respond to communication verification requests from a remote AE.

3.1.3.1.2 Accepted Presentation Contexts – Verify Communication

KinetDx Server will accept the Presentation Contexts shown in Table 3.1-18.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Table 3.1-18 Accepted Presentation Contexts - Verify Communication

3.1.3.1.3 SOP Specific Conformance – Verify Communication

KinetDx Server provides standard conformance to the DICOM Verification Service Class as an SCP.

3.1.3.1.4 Presentation Context Acceptance Criterion – Verify Communication

KinetDx Server will only accept the Presentation Context listed in Table 3.1-18.

3.1.3.2 Real-World Activity – Store Objects

3.1.3.2.1 Associated Real-World Activity – Store Objects

A remote AE can send objects to KinetDx Server for storage. All objects received by KinetDx Server can be retrieved at a later time. The access time to retrieve the objects varies depending on object location. KinetDx Server maintains three object states.

- ONLINE - Objects can be immediately retrieved from KinetDx Server.
- NEARLINE – Objects can be retrieved from KinetDx Server, however additional processing time is required.
- OFFLINE – Objects cannot be retrieved without human user intervention.

3.1.3.2.2 Accepted Presentation Contexts – Store Objects
KinetDx Server will accept the Presentation Contexts shown in Table 3.1-19.

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**	**Role**	**Extended Negotiation**
Name	**UID**	**Name UID**		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian 1.2.840.10008.1.2 Explicit VR Little Endian 1.2.840.10008.1.2.1	SCP	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.5			
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7			
X-ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Implicit VR Little Endian 1.2.840.10008.1.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Lossless, Process 14 1.2.840.10008.1.2.4.70	SCP	Yes
Ultrasound Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Implicit VR Little Endian 1.2.840.10008.1.2 Explicit VR Little Endian 1.2.840.10008.1.2.1 JPEG Baseline (Process 1) 1.2.840.10008.1.2.4.50 RLE Lossless 1.2.840.10008.1.2.5	SCP	Yes
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1			
Ultrasound Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6			
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1			

Table 3.1-19 Accepted Presentation Contexts – Store Objects

KinetDx Server supports Extended Negotiations for the Storage Service Class. KinetDx will supply the Sub Items shown in Table 3.1-20.

Filed Name	Value	Description of Field
Level of Support	2	Level 2 (Full) SCP
Element Coercion	0	Does not coerce any Data Elements

Table 3.1-20 Extended Negotiation – Store Objects

3.1.3.2.3 SOP Specific Conformance – Store Objects
KinetDx Server provides conformance to the DICOM Storage Service Class as a Level 2 (Full) SCP.

No optional elements are discarded. All Type 1, Type 2 and Type 3 attributes will be retained. Private attributes will be stored and included when the object is sent out again. KinetDx Server can decompress lossy compressed images and send them in uncompressed format. The Attribute Lossy Image Compression (0028,2110) remains “01”.

Upon successful storage of objects contained within a study the study can be automatically transferred to a remote AE or returned in response to a retrieval request. KinetDx Server can be configured to automatically archive or delete objects contained within a study. Studies may be manually transferred, archived or deleted through the graphical user interface.

When an object is received that has a SOP Instance UID (0008,0018), Study Instance UID (0020,000D) and Series Instance UID (0020,000E) of an object that is already present on KinetDx Server the existing object will be overwritten. When an object is received that has a SOP Instance UID but different Study Instance UID and Series Instance UID of an object that is already present on KinetDx Server, the new object will be assigned a new SOP Instance UID by KinetDx server.

KinetDx Server can be configured to lock an existing study after it has been marked as READ. KinetDx Server will not accept new objects and return an Error status.

KinetDx Server will return the C-STORE status codes shown in Table 3.1-21.

Service Status	Further Meaning	Status Codes	Description
Refused	Out of resources	A700	Indicates that there was not enough storage space to store the image. Recovery from this condition is left to the administrative functions.
	SOP Class not supported	A800	Indicates that the SOP Class of the Image in the C-STORE operation did not match the Abstract Syntax negotiated for the Presentation Context.
Error	Data set does not match SOP Class	A900	Indicates that the Data Set does not encode an instance of the SOP Class specified.
	Failed	C000	The operation was not successful.
	Unable to register object, study locked; no new objects allowed	C005	Indicates that no new objects can be added to this study because it has been locked.
	Cannot understand	C005	Indicates that the Data Set cannot be parsed into elements.
Warning	Data set does not match SOP Class	B007	Indicates that the Data Set does not match the SOP Class, but that the image was stored anyway.
	Duplicate SOP Instance UID	D000	Indicates that the SOP Instance UID of the specified image is already stored in the database.
Success	Success	0000	Operation performed properly.

Table 3.1-21 C-STORE Status Codes

If HIS Verification is enabled, KinetDx Server may modify the values of certain Attributes to match the values maintained by the HIS/RIS. KinetDx Server will issue a Modality Worklist query and modify the values indicated in Table 3.1-22.

MWL Attribute Name	MWL Tag	Object Attribute Tag	Object Tag	Overwrite Values	Overwrite Nulls
Accession Number	(0008,0050)	Accession Number	(0008,0050)	Yes	
Referring Physician Name	(0008,0090)	Referring Physician Name	(0008,0090)	Yes	
Referenced Patient Sequence	(0008,1120)			Yes	
>Referenced SOP Instance UID	(0008,1155)	Patient SOP Instance UID (4)	(0003,3000)	Yes	
Patient's Name	(0010,0010)	Patient's Name	(0010,0010)	Yes	

MWL Attribute Name	MWL Tag	Object Attribute Tag	Object Tag	Overwrite Values	Overwrite Nulls
Patient ID	(0010,0020)	Patient ID	(0010,0020)	Yes	
Patient's Birth Date	(0010,0030)	Patient's Birth Date	(0010,0030)	Yes	
Patient's Sex	(0010,0040)	Patient's Sex	(0010,0040)	Yes	
Other Patient IDs	(0010,1000)	Other Patient IDs	(0010,1000)	Yes	
Patient's Age	(0010,1010)	Patient's Age	(0010,1010)	Yes	
Military Rank	(0010,1080)	Military Rank	(0010,1080)	Yes	
Branch of Service	(0010,1081)	Branch of Service	(0010,1081)	Yes	
Study Instance UID	(0020,000D)	Study Instance UID	(0020,000D)	Yes	
Study Status ID	(0032,000A)	Study Status ID	(0032,000A)	Yes	
Study Priority ID	(0032,000C)	Study Priority ID	(0032,000C)	Yes	
Requesting Physician	(0032,1032)	Requesting Physician	(0032,1032)	Yes	
Requesting Service	(0032,0033)	Requesting Service	(0032,0033)	Yes	
Requested Procedure Description	(0032,1060)	Study Description (1)	(0008,1030)	No*	Yes
Requested Procedure Code Sequence	(0032,1064)				
>Code Value	(0008,0100)	Code Value	(0008,0100)	Yes	
>Code Meaning	(0008,0104)	Study Description (1)	(0008,1030)	No*	Yes
Current Patient Location	(0038,0300)	Current Patient Location	(0038,0300)	No*	Yes
Scheduled Procedure Step Sequence	(0040,0100)				
>Modality	(0008,0060)	Modality	(0008,0060)	No	No
>Scheduled Procedure Step Start Date	(0040,0002)	Study Date	(0008,0020)	No	Yes
>Scheduled Procedure Step Start Time	(0040,0003)	Study Time	(008,0030)	No	Yes
>Scheduled Performing Physician's Name	(0040,0006)	Performing Physician's Name	(0008,1050)	Yes	
>Scheduled Station Name	(0040,0010)	Station Name	(0008,1010)	No	Yes
>Comments on the Scheduled Procedure Step	(0040,0400)	Study Comments (3)	(0032, 4000)	No*	Yes
Requested Procedure ID	(0040,1001)	Requested Procedure ID	(0040,1001)	Yes	
Reason for the Requested Procedure	(0040,1002)	Additional Patient History Reason for Study (2)	(0010,21B0) (0032,1030)	No	Yes
Requested Procedure Comments	(0040,1400)	Study Comments (3)	(0032,4000)	No*	Yes
Reason for the Imaging Service Request	(0040,2001)	Additional Patient History Reason for Study (2)	(0010,21B0) (0032,1030)	No	Yes
Imaging Service Request Comments	(0040,2400)	Study Comments (3)	(0032, 4000)	No*	Yes

Table 3.1-22 Modality Worklist to DICOM IOD Mapping

Notes:

* Default Overwrite Value behavior. This behavior can be changed through configuration.

(1) Order used to search for Study Description: First non-null value from Requested Procedure Description or Code Meaning.

(2) Order used to search for Additional Patient History and Reason for Study: First non-null value from Reason for the Requested Procedure or Reason for the Imaging Service Request.

(3) Order used to search for Study Comments: First non-null value from Comments on the Scheduled Procedure Step, Requested Procedure Comments or Imaging Service Request Comments.

(4) Patient SOP Instance UID is a Private Data Element maintained by KinetDx Server.

3.1.3.2.4 Presentation Context Acceptance Criterion – Store Objects

KinetDx Server will accept any number of Storage Presentation Contexts shown in Table 3.1-19 per association request. Any one Abstract Syntax may be specified more than once in an association request if the transfer syntaxes differ between Presentation Contexts.

3.1.3.2.5 Transfer Syntax Selection Policies

KinetDx Server will prefer a compressed Transfer Syntax over an uncompressed Transfer Syntax. Lossless Compression is preferred over Lossy Compression and Explicit VR Little Endian is preferred over Implicit VR Little Endian.

3.1.3.3 Real-World Activity – Request Storage Commitment

3.1.3.3.1 Associated Real-World Activity – Request Storage Commitment

KinetDx Server stores objects sent by a remote AE. The remote AE can transmit a Storage Commitment Request with a list of references to one or more SOP Instances. KinetDx Server will return a Storage Commitment Result to the remote AE.

3.1.3.3.2 Accepted Presentation Contexts – Request Storage Commitment

KinetDx Server will accept the Presentation Contexts shown in Table 3.1-23.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

Table 3.1-23 Accepted Presentation Contexts - Request Storage Commitment

3.1.3.3.3 SOP Specific Conformance – Request Storage Commitment

KinetDx Server provides partial conformance to the DICOM Storage Commitment Service Class as an SCP. The KinetDx Server does not support explicit role negotiation.

3.1.3.3.3.1 Request Storage Commitment – Operations

KinetDx Server will store SOP Instances indefinitely unless the instances are manually deleted by a user with appropriate system permissions. The capacity is limited only by the availability of archive storage and volatility is dependent on the archive medium used. KinetDx Server will stop accepting new objects for storage to ensure the availability of objects for which a successful storage commitment response has been sent.

KinetDx Server can be configured not to archive objects received from a remote AE. A successful storage commitment request will be returned to the remote AE, however the persistence of storage will be dependent on the amount of storage capacity available on KinetDx Server and disk management configuration settings of the system.

KinetDx Server does not support the optional Storage Media and File-Set ID and UID Attributes in the N-ACTION. KinetDx Server supports the Action Type and Action Information shown in Table 3.1-24.

Action Type Name	Action Type ID	Attribute	Tag
Request Storage Commitment	1	Transaction UID	(0008,1195)
		Referenced SOP Sequence	(0008,1199)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		Referenced Study Component Sequence	(0008,1111)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)

Table 3.1-24 Storage Commitment Request – Action Information

3.1.3.3.3.2 Request Storage Commitment – Notifications

KinetDx Server will process the Storage Commitment Request determine if the SOP Instances have been successfully committed to storage. KinetDx Server will generate a Storage Commitment Result that will always be sent on a separate association and includes references to the successfully and unsuccessfully stored SOP Instances.

KinetDx Server does not support the optional Storage Media and File-Set ID and UID or Retrieve AE Title (0008,0054) Attributes in the N-EVENT-REPORT. KinetDx Server supports the Event Type and Event Information shown in Table 3.1-25.

Event Type Name	Event Type ID	Attribute	Tag
Storage Commitment Request Successful	1	Transaction UID	(0008,1195)
		Referenced SOP Sequence	(0008,1199)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		Referenced Study Component Sequence	(0008,1111)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
Storage Commitment Request Complete – Failures Exist	2	Transaction UID	(0008,1195)
		Referenced SOP Sequence	(0008,1199)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		Failed SOP Sequence	(0008,1198)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)
		Referenced Study Component Sequence	(0008,1111)
		>Referenced SOP Class UID	(0008,1150)
		>Referenced SOP Instance UID	(0008,1155)

Table 3.1-25 Storage Commitment Result – Event Information

3.1.3.3.4 Presentation Context Acceptance Criterion – Request Storage Commitment

KinetDx Server will only accept the Presentation Context listed in Table 3.1-23.

3.1.3.3.5 Transfer Syntax Selection Policies – Request Storage Commitment

KinetDx Server only supports Implicit VR Little Endian for this Real World Activity.

3.1.3.4 Real-World Activity – Find Object

3.1.3.4.1 Associated Real World Activity – Find Object

KinetDx Server will respond to a query request by a remote AE. KinetDx Server supports queries for composite objects at the Instance Level.

KinetDx Server supports the query/retrieve services indicated in Table 3.1-26. The latency for retrieval of SOP Instances is dependent on the object state:

- ONLINE - Objects can be immediately retrieved from KinetDx Server.
- NEARLINE – Objects can be retrieved from KinetDx Server, however additional processing time is required.
- OFFLINE – Objects cannot be retrieved without human user intervention.

KinetDx Server can be configured to return results for objects with an ONLINE state only or all objects maintained in the KinetDx Database regardless of state.

3.1.3.4.2 Accepted Presentation Contexts – Find Object

KinetDx Server will accept the Presentation Contexts shown in Table 3.1-26.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Patient Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	Yes
Study Root Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.2.1				
Patient/Study Only Query/Retrieve IM Find	1.2.840.10008.5.1.4.1.2.3.1				

Table 3.1-26 Accepted Presentation Contexts – Find Object

3.1.3.4.3 SOP Specific Conformance – Find Object

KinetDx Server provides standard conformance to the DICOM Query/Retrieve Service Class as an SCP.

KinetDx Server supports the Relational-queries extended SCP behavior. KinetDx Server supports all mandatory Unique and Required Matching Keys. Case-insensitive matching for PN VR attributes is supported.

KinetDx Server provides support for the Instance Availability (0008,0056) Data Element.

Attributes supported in the Patient Root Query are listed in Table 3.1-27.

Patient Root Query Attributes			
Level	**Description**	**Tag**	**Type**
Patient	Patient's Name	(0010,0010)	R
Patient	Patient ID	(0010,0020)	U
Patient	Patient's Birth Date	(0010,0030)	O
Patient	Patient's Sex	(0010,0040)	O
Patient	Other Patient Ids	(0010,1000)	O
Patient	Patient Instance UID	(0003,3000)	O Note 1
Patient	Current Patient Location	(0038,0300)	O Note 2
Study	Study Date	(0008,0020)	R
Study	Study Time	(0008,0030)	R

Study	Accession Number	(0008,0050)	R
Study	Study ID	(0020,0010)	R
Study	Study Instance UID	(0020,000D)	U
Study	Referring Physician's Name	(0008,0090)	O
Study	Study Description	(0008,1030)	O
Study	Name of Physician(s) Reading Study	(0008,1060)	O
Study	Admitting Diagnoses Description	(0008,1080)	O
Study	Patient's Age	(0010,1010)	O
Study	Additional Patient History	(0010,21B0)	O
Study	Number of Study Related Instances	(0020,1208)	O
Study	Station Name	(0008,1010)	O Note 2
Study	Performing Physician's Name	(0008,1050)	O Note 2
Study	Study Status ID	(0032,000A)	O Note 2
Study	Requesting Physician	(0032,1032)	O Note 2
Series	Modality	(0008,0060)	R
Series	Series Number	(0020,0011)	R
Series	Series Instance UID	(0020,000E)	U
Series	Series Description	(0008,103E)	O
Series	Operator's Name	(0008,1070)	O
Series	Body Part Examined	(0018,0015)	O
Instance	Instance Number	(0020,0013)	R
Instance	SOP Instance UID	(0008,0018)	U

Table 3.1-27 Patient Root Query Attributes

Note 1: Patient Instance UID (0003,3000) is a Private Attribute maintained by KinetDx Server that can be returned by standard queries.

Note 2: These Attributes are not part of the Q/R Information Model.

KinetDx Server supports the Relational-queries extended SCU behavior. The Attributes supported in the Study Root Query are listed in Table 3.1-28.

Study Root Query Attributes			
Level	**Description**	**Tag**	**Type**
Study	Study Date	(0008,0020)	R
Study	Study Time	(0008,0030)	R
Study	Accession Number	(0008,0050)	R
Study	Patient's Name	(0010,0010)	R
Study	Patient ID	(0010,0020)	R
Study	Study ID	(0020,0010)	R
Study	Study Instance UID	(0020,000D)	U
Study	Referring Physician's Name	(0008,0090)	O
Study	Study Description	(0008,1030)	O
Study	Name of Physician(s) Reading Study	(0008,1060)	O
Study	Admitting Diagnoses Description	(0008,1080)	O
Study	Patient's Birth Date	(0010,0030)	O
Study	Patient's Sex	(0010,1040)	O
Study	Other Patient Ids	(0010,1000)	O
Study	Patient's Age	(0010,1010)	O
Study	Additional Patient History	(0010,21B0)	O
Study	Number of Study Related Instances	(0020,1208)	O
Study	Patient Instance UID	(0003,3000)	O Note 1
Study	Station Name	(0008,1010)	O Note 2

Study	Performing Physician's Name	(0008,1050)	O Note 2
Study	Study Status ID	(0032,000A)	O Note 2
Study	Requesting Physician	(0032,1032)	O Note 2
Study	Current Patient Location	(0038,0300)	O Note 2
Series	Modality	(0008,0060)	R
Series	Series Number	(0020,0011)	R
Series	Series Instance UID	(0020,000E)	U
Series	Series Description	(0008,103E)	O
Series	Operator's Name	(0008,1070)	O
Series	Body Part Examined	(0018,0015)	O
Instance	Instance Number	(0020,0013)	R
Instance	SOP Instance UID	(0008,0018)	U

Table 3.1-28 Study Root Query Attributes

Note 1: Patient Instance UID (0003,3000) is a Private Attribute maintained by KinetDx Server that can be returned by standard queries.

Note 2: These Attributes are not part of the Q/R Information Model.

The Patient and Study Level Attributes in Table 3.1-27 are also supported for the Patient/Study Only Query/Retrieve.

KinetDx Server will return the C-FIND status codes shown in Table 3.1-29.

Service Status	Further Meaning	Status Codes	Description
Refused	Out of resources	A700	
Failed	Identifier does not match SOP Class	A900	
	Unable to Process	C001	KinetDx Server can not process the request at this time.
Cancel	Matching terminated due to Cancel Request	FE00	The original requester canceled this operation.
Pending	Pending	FF00	All Optional Keys are supported in the same manner as Required Keys.
	Pending	FF01	The matching operation is continuing. Warning that one or more Optional Keys were not supported in the same manner as Required.
Success	Success	0000	Operation performed properly.

Table 3.1-29 C-FIND Status Codes

3.1.3.4.4 Presentation Context Acceptance Criterion – Find Object

KinetDx Server will accept any of the Presentation Contexts listed in Table 3.1-26.

3.1.3.4.5 Transfer Syntax Selection Policies – Find Object

KinetDx Server only supports Implicit VR Little Endian for this Real World Activity.

3.1.3.5 Real-World Activity – Move Object

3.1.3.5.1 Associated Real World Activity – Move Object

KinetDx Server will respond to an object move request by a remote AE. KinetDx Server supports move requests for composite objects at the Instance Level.

KinetDx Server will establish a new Association with the Remote AE specified in the Move Destination for the C_STORE sub-operations. KinetDx Server will propose the transfer syntax used when the object was initially accepted by the server and Implicit VR Little Endian. Actions specific to the C-STORE sub-operations are detailed in Section 3.1.2.2.

3.1.3.5.2 Accepted Presentation Contexts – Move Object

KinetDx Server will accept the Presentation Contexts shown in Table 3.1-30.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	Yes
Study Root Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.2.2				
Patient/Study Only Query/Retrieve IM Move	1.2.840.10008.5.1.4.1.2.3.2				

Table 3.1-30 Accepted Presentation Contexts – Move Object

3.1.3.5.3 SOP Specific Conformance – Move Object

KinetDx Server provides standard conformance to the DICOM Query/Retrieve Service Class as an SCP.

KinetDx Server supports the Relational-retrieval extended SCP behavior. KinetDx Server supports C-STORE sub-operations for all Storage SOP Classes detailed in Section 3.1.2.2.

KinetDx Server will return the C-MOVE status codes shown in Table 3.1-31.

Service Status	Further Meaning	Status Codes	Description
Refused	Out of resources	A701	Unable to calculate number of matches.
	Out of Resources	A702	Unable to perform storage of images to move destination.
Failed	Move Destination Unknown	A801	The destination of this move request is unknown.
	Identifier does not match SOP Class	A900	The specified identifier contains a request that does not match the specified SOP Class.
	Unable to Process	C002	KinetDx Server can not process the request at this time.
Cancel	Sub-operations terminated due to Cancel Indication	FE00	The original requester canceled this operation.
Warning	Sub-operations	B000	Storage complete with one or more failures.

	Complete – One or more Failures		
Pending	Sub-Operations are Continuing	FF00	The Storage sub-operation is continuing.
	Sub-Operations are Continuing	FF02	The Storage sub-operation is expected to require a long period of time to complete. The SCU may break the Association at any time but the operation will continue to completion.
Success	Success	0000	Operation performed properly.

Table 3.1-31 C-MOVE Status Codes

3.1.3.5.4 Presentation Context Acceptance Criterion – Move Object
KinetDx Server will accept any of the Presentation Contexts listed in Table 3.1-30.

3.1.3.5.5 Transfer Syntax Selection Policies – Move Object
KinetDx Server only supports Implicit VR Little Endian for this C-MOVE operation of this Real World Activity. KinetDx Server will propose the transfer syntax used when the object was initially accepted by the server and Implicit VR Little Endian in the C-STORE sub-operation of the Real World Activity.

3.1.3.6 Real-World Activity – Unsolicited Notifications

3.1.3.6.1 Associated Real World Activity – Unsolicited Notifications
KinetDx Server will accept unsolicited notifications from a remote AE.

3.1.3.6.2 Accepted Presentation Contexts – Unsolicited Notifications
KinetDx Server will accept the Presentation Contexts shown in Table 3.1-32.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Detached Patient Management	1.2.840.10008.3.1.2.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No
Detached Visit Management	1.2.840.10008.3.1.2.2.1				
Detached Study Management	1.2.840.10008.3.1.2.3.1				
Detached Interpretation Management	1.2.840.10008.3.1.2.6.1				

Table 3.1-32 Accepted Presentation Contexts – Unsolicited Notifications

3.1.3.6.3 SOP Specific Conformance – Unsolicited Notifications
KinetDx Server provides standard conformance to the DICOM Patient Management, Study Management and Results Management Service Classes as an SCU.

3.1.3.6.3.1 Detached Patient Management - Notifications
KinetDx Server supports the DIMSE N-EVENT REPORT for the Event Types shown in Table 3.1-33.

The Patient Created and Patient Deleted Event Types do not initiate any action by KinetDx Server.

Event Type Name	Event Type ID
Patient Created	*1*
Patient Deleted	*2*
Patient Updated	3

Table 3.1-33 Patient Notification Event Types

When KinetDx Server receives a Patient Updated Event Type, it will update all studies which are referenced by the Referenced Study Sequence (0008,1110) contained in the Data Set. If no Referenced Study Sequence is sent, KinetDx Server will update all studies which contain the same Patient Instance UID as the Affected SOP Instance UID in the Command Set of the Event.

The only Attributes that may be updated by a Patient Updated Event Type are:

Patient Name	(0010,0010)
Patient ID	(0010,0020)
Patient Birth Date	(0010,0030)
Patient Sex	(0010,0040)
Other Patient Ids	(0010,1000)
Current Patient Location	(0038,0300)

3.1.3.6.3.2 Detached Visit Management – Notifications
KinetDx Server supports the DIMSE N-EVENT-REPORT for the Event Types shown in Table 3.1-34.

The Visit Created, Patient Admitted, Patient Discharged, Visit Deleted and Visit Updated Event Types do not initiate any action by KinetDx Server.

Event Type Name	Event Type ID
Visit Created	*1*
Visit Scheduled	2
Patient Admitted	*3*
Patient Transferred	4
Patient Discharged	*5*
Visit Deleted	*6*
Visit Updated	*7*

Table 3.1-34 Visit Notification Event Types

When a Visit Scheduled Event is received, KinetDx Server can pre-fetch prior studies based on configuration rules.

When a Patient Transferred Event is received, KinetDx Server will search for all studies which contain the same Patient Instance UID as the Referenced Patient Sequence and the same Study Instance UID as the Referenced Study Sequence. KinetDx Server will update the Current Patient Location field.

3.1.3.6.3.3 Detached Study Management – Notifications
KinetDx Server supports the DIMSE N-EVENT REPORT for the Event Types shown in Table 3.1-35.

The Study Started, Study Completed, Study Verified and Study Deleted Event Types do not initiate any action by KinetDx Server.

Event Type Name	Event Type ID
Study Created	1
Study Scheduled	2
Patient Arrived	3
Study Started	*4*
Study Completed	*5*
Study Verified	*6*
Study Read	7

Study Deleted	*8*
Study Updated	9

Table 3.1-35 Study Notification Event Types

When KinetDx Server receives a Study Notification Event, it will use the Affected SOP Instance UID in the Command Set of the Event as the Study Instance UID in a Modality Worklist query. The Study Instance UID will be the only matching Attribute in the query. The Modality Worklist query is described in Section 3.1.2.6.3.

KinetDx Server can use the results returned from the query to update the study and apply configured pre-fetching rules.

KinetDx Server does not use any of the Attributes contained within the Data Set of the Event.

3.1.3.6.3.4 Detached Interpretation Management – Notifications

KinetDx Server supports the DIMSE N-EVENT-REPORT for the Event Types shown in Table 3.1-36.

The Interpretation Created and Interpretation Deleted Event Types do not initiate any action by KinetDx Server.

Event Type Name	Event Type ID
Interpretation Created	*1*
Interpretation Recorded	2
Interpretation Transcribed	3
Interpretation Approved	4
Interpretation Deleted	*5*
Interpretation updated	6

Table 3.1-36 Interpretation Notification Event Types

KinetDx Server will update the reported status field in the database depending on the Event Type Received.

3.1.3.6.4 Presentation Context Acceptance Criterion – Unsolicited Notifications

KinetDx Server will accept any of the Presentation Contexts listed in Table 3.1-32.

3.1.3.6.5 Transfer Syntax Selection Policies – Unsolicited Notifications

KinetDx Server only supports Implicit VR Little Endian for this Real World Activity.

4. COMMUNICATION PROFILES

4.1 SUPPORTED COMMUNICATION STACKS

KinetDx Server provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard

4.2 OSI STACK

Not supported.

4.3 TCP/IP STACK

KinetDx Server DICOM services use the TCP/IP stack from the Microsoft Windows NT operating system upon which it executes.

4.3.1 Physical Media Support

KinetDx Server DICOM services are not dependent on the physical medium over which the TCP/IP executes.

4.4 POINT-TO-POINT STACK

Not Supported.

5. EXTENSIONS/SPECIALIZATIONS/PRIVATIZATIONS

5.1 PRIVATE SOPS

The KinetDx Server Application Entity provides Conformance to the private SOP Classes listed in Table 5.1-1 as an SCU and/or SCP:

SOP Class	SOP Class UID	SCU/SCP
Acuson Structured Report Detail Storage	1.2.840.10008.5.1.4.1.1.88.3	Y/Y
Mitra Detached Patient Management	1.2.840.113532.3500.10	Y/N
Mitra Detached Visit Management	1.2.840.113532.3500.11	Y/N
Mitra Detached Study Management	1.2.840.113532.3500.13	Y/N
Mitra Detached Interpretation Management	1.2.840.113532.3500.16	Y/N

Table 5.1-1 KinetDx Server Supported SOP Classes

5.1.1 Association Initiation by Real-World Activity

KinetDx Server only initiates associations for the following real-world activities:

- Store Private Objects

5.1.1.1 Real-World Activity – Store Private Objects

5.1.1.1.1 Associated Real World-Activity – Store Private Objects

KinetDx Server will send private objects that have been sent to it previously to a remote AE for storage. An association is established when the user initiates a transmit request. KinetDx Server will establish an association automatically in response to a C-MOVE request, archive to PACS autopilot notification or configured study routing rules.

5.1.1.1.2 Proposed Presentation Contexts – Store Private Objects

KinetDx Server may propose any of the Presentation Contexts shown in Table 5.1-2.

Presentation Context Table				
Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	UID	Name UID		
Acuson Structured Report Detail Storage	1.2.840.10008.5.1.4.1.1.88.3	Implicit VR Little Endian 1.2.840.10008.1.2	SCU	None

Table 5.1-2 Proposed Presentation Contexts – Store Private Objects

5.1.1.1.3 SOP Specific Conformance – Store Private Objects

KinetDx Server provides conformance as specified in Section 3.1.2.2.

5.1.2 Association Acceptance Policy

KinetDx Server accepts associations for the following real-world activities:

- Store Private Objects
- Private Notification of Patient/Study Information Change

5.1.2.1 Real-World Activity – Store Private Objects

5.1.2.1.1 Associated Real World-Activity – Store Private Objects

A remote AE can send private objects to KinetDx Server for storage. All private objects received by KinetDx Server can be retrieved at a later time as described in Section 3.1.3.2.

5.1.2.1.2 Accepted Presentation Contexts – Store Private Objects

KinetDx Server will accept the Presentation Contexts shown in Table 5.1-3.

Presentation Context Table				
Abstract Syntax		**Transfer Syntax**	**Role**	**Extended Negotiation**
Name	**UID**	**Name UID**		
Acuson Structured Report Detail Storage	1.2.840.10008.5.1.4.1.1.88.3	Implicit VR Little Endian 1.2.840.10008.1.2	SCP	None

Table 5.1-3 Accepted Presentation Contexts – Store Private Objects

5.1.2.1.3 SOP Specific Conformance – Store Private Object

KinetDx Server provides conformance as specified in Section 3.1.3.2.

5.1.2.1.4 Presentation Context Acceptance Criterion – Store Private Object

KinetDx Server will accept any of the Presentation Contexts listed in Table 5.1-3.

5.1.2.1.5 Transfer Syntax Selection Policies – Store Private Objects

KinetDx Server only supports Implicit VR Little Endian for this Real World Activity.

5.1.2.2 Real-World Activity – Unsolicited Private Notifications

5.1.2.2.1 Associated Real World Activity – Unsolicited Private Notifications

KinetDx Server will accept unsolicited private notifications from a remote AE.

5.1.2.2.2 Accepted Presentation Contexts – Unsolicited Private Notifications

KinetDx Server will accept the Presentation Contexts shown in Table 5.1-4.

Presentation Context Table					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name**	**UID**		
Mitra Detached Patient Management	1.2.840.113532.3500.10	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No
Mitra Detached Visit Management	1.2.840.113532.3500.11				
Mitra Detached Study Management	1.2.840.113532.3500.13				
Mitra Detached Interpretation Management	1.2.840.113532.3500.16				

Table 5.1-4 Accepted Presentation Contexts – Unsolicited Private Notifications

5.1.2.2.3 SOP Specific Conformance – Unsolicited Private Notifications

KinetDx Server provides support for Mitra Private Service Classes as an SCU. KinetDx Server performs the same actions as the Standard DICOM equivalent Service Classes.

5.1.2.2.3.1 Mitra Detached Patient Management - Notifications

KinetDx Server supports the DIMSE N-EVENT-REPORT for the Event Types shown in Section 3.1.3.6.3.1.

5.1.2.2.3.2 Mitra Detached Visit Management – Notifications

KinetDx Server supports the DIMSE N-EVENT-REPORT for the Event Types shown in Section 3.1.3.6.3.2.

5.1.2.2.3.3 Mitra Detached Study Management – Notifications

KinetDx Server supports the DIMSE N-EVENT-REPORT for the Event Types shown in Section 3.1.3.6.3.3.

5.1.2.2.3.4 Mitra Detached Interpretation Management – Notifications

KinetDx Server supports the DIMSE N-EVENT-REPORT for the Event Types shown in Section 3.1.3.6.3.4.

5.1.2.2.4 Presentation Context Acceptance Criterion – Unsolicited Private Notifications

KinetDx Server will accept any of the Presentation Contexts listed in Table 5.1-4. KinetDx Server will prefer the Private SOP Classes over the Standard DICOM equivalent Service Classes.

5.1.2.2.5 Transfer Syntax Selection Policies – Unsolicited Private Notifications

KinetDx Server only supports Implicit VR Little Endian for this Real World Activity.

6. CONFIGURATION

6.1 AE TITLE/PRESENTATION ADDRESS MAPPING

The AE Title for KinetDx Server is the NetBIOS Name of the computer. This parameter can be configured at time of install and is limited to 15 characters. Mapping from AE Title to TCP/IP addresses and ports is maintained within the KinetDx Server database and set at time of installation.

6.2 CONFIGURABLE PARAMETERS

The configurable parameters of the KinetDx Server are stored in the database. The following items are configurable:

Remote AE Title	Allows the KinetDx Server to initiate or accept associations from a remote AE.
Port	Listening Port used by the remote AE uses to accept DICOM communications.
Packet Size	The maximum size in bytes of the packet used to communicate with the remote AE.
Read Timeout	How long a communication pause is tolerated before the connection is reset.
Connect Timeout	How long KinetDx Server waits for a response when trying to establish communication with the remote AE.

7. SUPPORT OF EXTENDED CHARACTER SETS

KinetDx Server supports the following character sets:

- ISO-IR 6 (default) Default repertoire
- ISO-IR 100 Latin Alphabet No. 1

KinetDx Server does not support multi-byte characters.